

# Power Management

**Programmable Power**  
Universal PMICs

**Power Conversion**  
Power Modules  
Switching Regulators  
Advanced DrMOS  
Switching Controllers  
DDR Termination  
Linear Regulators  
LDOs

**System Controls**  
Power Switches  
Voltage References  
Supervisors

**LED Lighting**  
AC Step Drivers  
Switching Regulators

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# Power Management Portfolio

| Programmable Power |  |            |           |
|--------------------|--|------------|-----------|
| Triple PMICs       |  | Quad PMICs |           |
| XR7713             |  | XRP7704    | XRP7724   |
| XR77103            |  | XRP7714    | XR77128   |
|                    |  | XRP7740    | MxL7704-A |
|                    |  |            | MxL7704-X |

| Power Conversion |                      |                |           |         |                |                       |        |          |                 |                   |         |
|------------------|----------------------|----------------|-----------|---------|----------------|-----------------------|--------|----------|-----------------|-------------------|---------|
| Power Modules    | Switching Regulators |                |           |         | Power Stage    | Switching Controllers | Linear |          |                 |                   |         |
|                  | AEC-Q100 Qualified   | Step-Down >20V | Step-Down | Step-Up | Advanced DrMOS | Step-Down             | LDOs   |          | DDR Termination | Linear Regulators |         |
| XR79110          | XR76203-Q            | SP7650         | SP6652    | SP6641  | XR78021        | SP6123                | LP2951 | SPX1117  | SPX2941         | XRP2997           | SP78L05 |
| XR79115          | XR76205-Q            | SP7651         | SP6654    | SP6661  |                | SP6128                | SP6201 | SPX1582  | SPX2945         |                   |         |
| XR79120          | XR76208-Q            | SP7652         | SP6669    | SP6648  |                | SP6132                | SP6203 | SPX1587  | SPX2954         |                   |         |
| XR79103          |                      | SP7662         | XRP6657   | SP34063 |                | SP6133                | SP6205 | SPX2815  | SPX3819         |                   |         |
| XR79106          |                      | XRP7662        | XRP6658   |         |                | SP6134                | SP6213 | SPX29150 | SPX3940         |                   |         |
| XR79203          |                      | XR76108        | XRP6668   |         |                | XRP6124               | SP6260 | SPX29152 | SPX5205         |                   |         |
| XR79206          |                      | XR76112        | SP34063   |         |                | XRP6141               |        | SPX29300 | XRP29302        |                   |         |
| MxL7204          |                      | XR76115        | XRP6670   |         |                | XR75100               |        | SPX29301 | XRP6272         |                   |         |
|                  |                      | XR76117        | XRP7659   |         |                |                       |        | SPX29302 |                 |                   |         |
|                  |                      | XR76121        | XRP7675   |         |                |                       |        |          |                 |                   |         |
|                  |                      | XR76203        | XRP7664   |         |                |                       |        |          |                 |                   |         |
|                  |                      | XR76205        | XRP7665   |         |                |                       |        |          |                 |                   |         |
|                  |                      | XR76208        |           |         |                |                       |        |          |                 |                   |         |
|                  |                      | XR76201        |           |         |                |                       |        |          |                 |                   |         |

| System Controls |         |                    |         |             |       |       |
|-----------------|---------|--------------------|---------|-------------|-------|-------|
| Power Switches  |         | Voltage References |         | Supervisors |       |       |
| Single          | Dual    |                    |         |             |       |       |
| SP2525A         | SP2526A | SPX1431            | SPX2431 | SP690       | SP691 | SP705 |
| SP619           | XRP2526 | SPX385             | SPX431L | SP706       | SP707 | SP708 |
|                 |         | SPX432             | SPX431A | SP813       | SP809 |       |

| LED Lighting    |         |                      |              |         |
|-----------------|---------|----------------------|--------------|---------|
| AC Step Drivers |         | Switching Regulators |              |         |
|                 |         | Step-Down            | Step-Up/Down | Step-Up |
| XR46203         | XR46084 | XRP7613              | SP6686       | SP6699  |
| XR46110         | XR46083 |                      | SP7685       |         |
| XR46073         | XR46010 |                      |              |         |
| XR46050         | XR46014 |                      |              |         |
| XR46701         | XR46000 |                      |              |         |

MaxLinear's universal PMICs with programmable power technology offer advanced dynamic control, telemetry and remote reconfigurability. PowerArchitect design and configuration software speeds development and significantly reduces overall time to market compared to legacy analog power solutions. An I<sup>2</sup>C interface and multiple GPIO pins ensure easy system integration. Configurable warning and fault levels, fault behavior and power up and down sequencing ensure that any load can be properly powered and protected.

## Applications

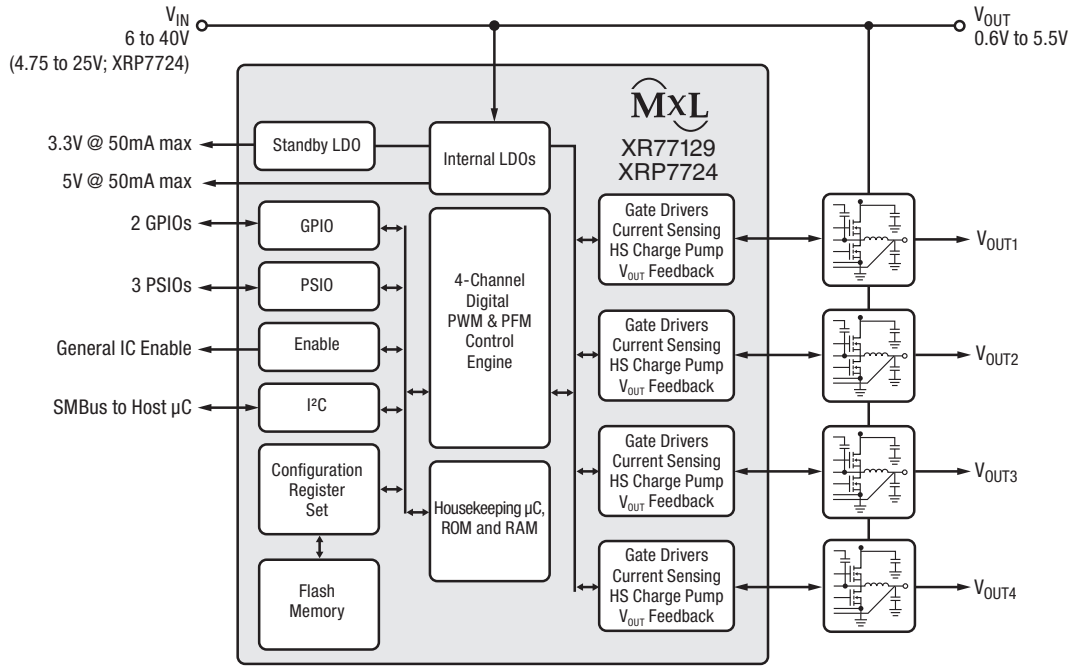
- **FPGA, DSP and ASIC power systems**
- **Base stations**
- **x86 and ARM servers**
- **Networking**
- **Telecommunications**
- **Industrial and embedded systems**

## Universal PMICs

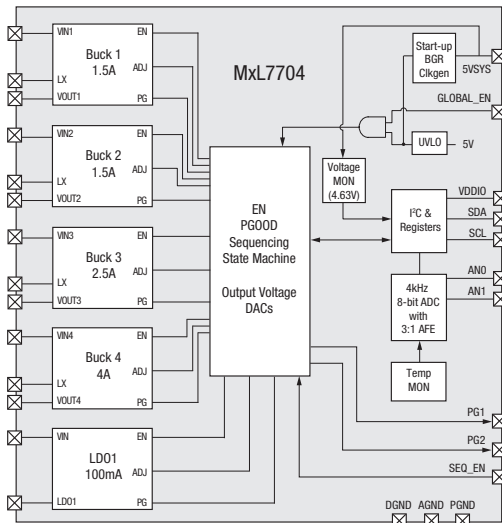
| Part Number | Ch. | Gate Drive Resistance Up/Down (Ω) | Operating Voltage (V) |     | Min Output Voltage (V)   | Quiescent Current (mA) | Programmable Frequency Range (MHz) | Package | Features   |
|-------------|-----|-----------------------------------|-----------------------|-----|--------------------------|------------------------|------------------------------------|---------|--|
|             |     |                                   | Min                   | Max |                          |                        |                                    |         |  |
| XR77103*    | 3   | Integrated MOSFETs                | 4.5                   | 14  | 0.8                      | 1.5                    | 0.3 to 2.2                         | TQFN-32 | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ UVLO, OTP, soft-start</li> <li>▪ Light load efficiency - PFM and PWM mode</li> <li>▪ Overcurrent and output overvoltage protection</li> <li>▪ I<sup>2</sup>C reconfigurable</li> </ul>                     |
| MxL7704-A   | 4   | 1.5A<br>1.5A<br>2.5A<br>4A        | 4.5                   | 5.5 | 3.0<br>1.3<br>0.8<br>0.6 | 8                      | 1 to 2.1                           | QFN32   | <ul style="list-style-type: none"> <li>▪ Two configurable power good outputs</li> <li>▪ LDO and 2-input 8-bit ADC</li> <li>▪ Temperature monitoring</li> <li>▪ Supported by Excel configuration tool</li> <li>▪ Sequencing I/O first, core last</li> </ul>                 |
| MxL7704-X   | 4   | 1.5A<br>1.5A<br>2.5A<br>4A        | 4.5                   | 5.5 | 3.0<br>1.3<br>0.8<br>0.6 | 8                      | 1 to 2.1                           | QFN32   | <ul style="list-style-type: none"> <li>▪ Two configurable power good outputs</li> <li>▪ LDO and 2-input 8-bit ADC</li> <li>▪ Temperature monitoring</li> <li>▪ Supported by Excel configuration tool</li> <li>▪ Sequencing for Xilinx® Zynq® UltraScale+™ ZU2/3</li> </ul> |
| XR77129     | 4   | 4/2                               | 6                     | 40  | 0.6                      | 4                      | 0.1 to 1.2                         | TQFN-44 | <ul style="list-style-type: none"> <li>▪ 40V digital PWM/PFM controller</li> <li>▪ I<sup>2</sup>C reconfigurable</li> <li>▪ Built-in 3.3V/5V LDO</li> <li>▪ Integrated MOSFET drivers</li> </ul>   |
| XR77128     | 4   | 4/2<br>DrMOS output               | 4.75                  | 25  |                          |                        |                                    |         | <ul style="list-style-type: none"> <li>▪ Updated fault management and GPIO functionality, with the ability to drive MOSFETs and DrMOS</li> </ul>   |
| XRP7724     | 4   | 4/2                               | 4.75                  | 25  | 0.6                      | 4                      | 0.1 to 1.2                         | TQFN-44 | <ul style="list-style-type: none"> <li>▪ Digital PWM controller with DPFM mode</li> <li>▪ I<sup>2</sup>C reconfigurable</li> <li>▪ Built-in 3.3V/5V LDO</li> <li>▪ Integrated MOSFET drivers</li> <li>▪ Full protection</li> </ul>   |
| XRP7725     |     |                                   | 4.75                  | 25  |                          |                        |                                    |         | <ul style="list-style-type: none"> <li>▪ Intel® Node Manager compatible</li> <li>▪ Programmable power system</li> <li>▪ XRP7724 pin and function compatible</li> </ul>   |
| XRP7713     | 3   | 6/3                               | 4.75                  | 25  | 0.9                      | 9                      | 0.3 to 1.5                         | TQFN-32 | <ul style="list-style-type: none"> <li>▪ Digital PWM controller</li> <li>▪ Faults, warnings, sequencing, GPIOs and PID compensation are all I<sup>2</sup>C reconfigurable</li> <li>▪ 3.3V or 5V selectable LDO</li> <li>▪ Integrated MOSFET drivers</li> </ul>             |
| XRP7714     | 4   |                                   |                       |     |                          |                        |                                    | TQFN-40 |  |
| XRP7704     | 4   | - / -                             | 6.5                   | 20  | 0.9                      | 9                      | 0.3 to 1.5                         | TQFN-40 |  |
| XRP7740     | 4   | 3/1.8                             |                       |     |                          |                        |                                    |         |  |

\* Preliminary





Functional Block Diagram

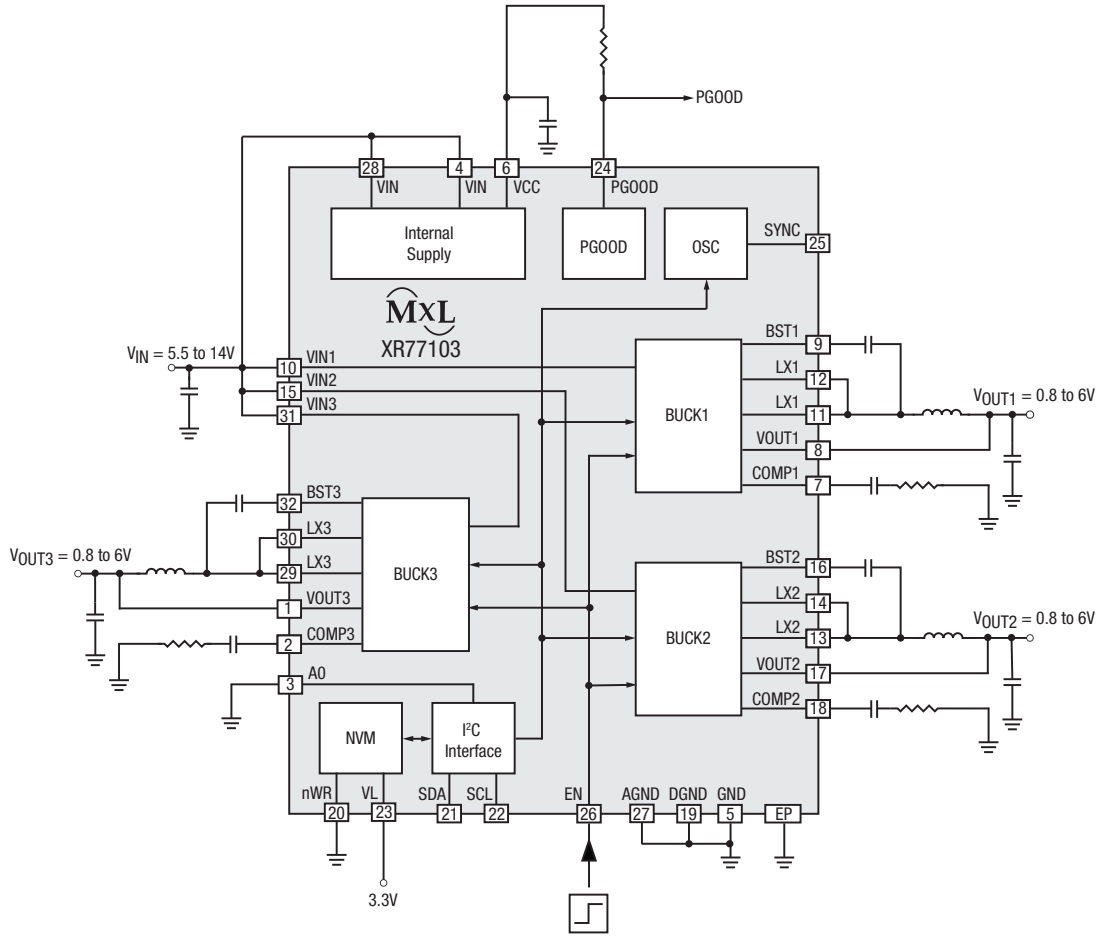


MxL7704 Functional Block Diagram

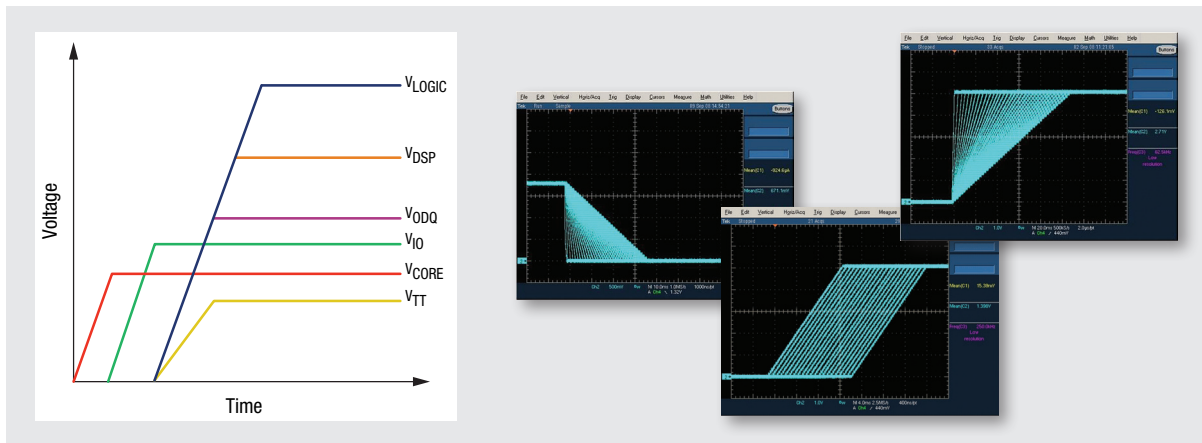
### Perfect Power Companion for Xilinx® Ultrascale+™ ZU2, ZU3

Universal PMIC features:

- Sequencing engine with PGOOD handling
- Integrated 8-bit ADC provides telemetry and flexibility



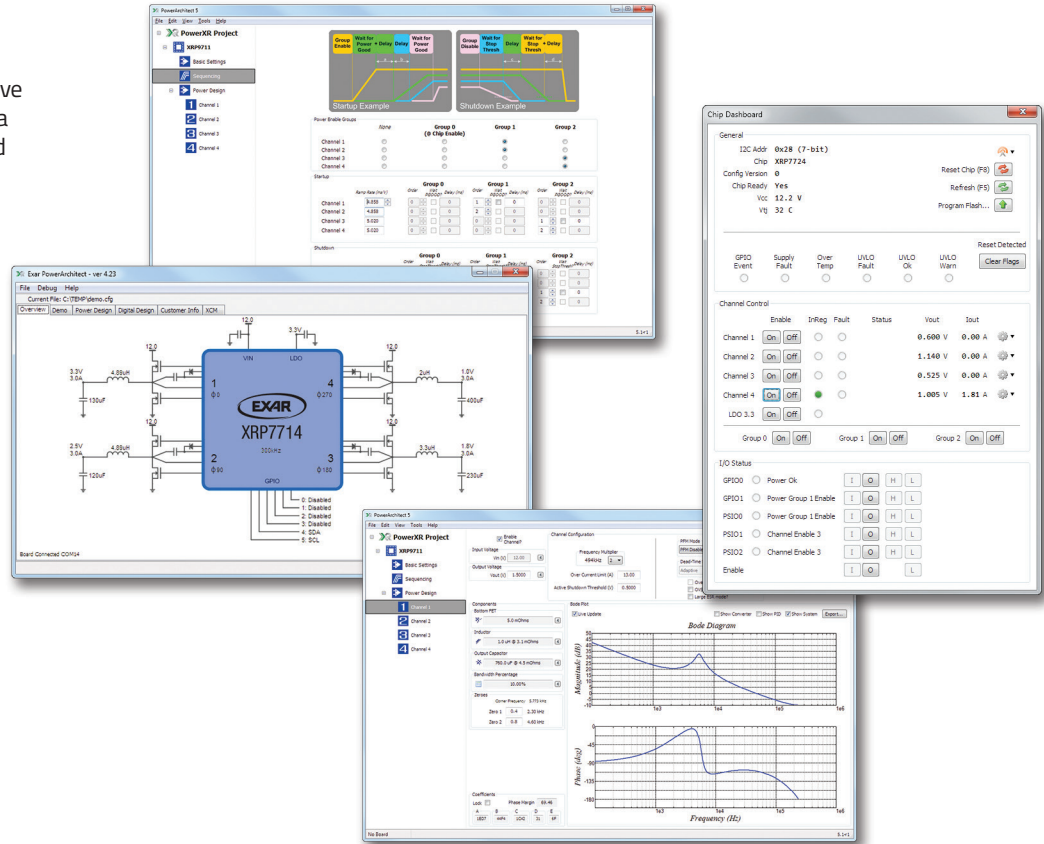
**Universal PMIC 3-Output Programmable Buck Regulator Typical Application**



**Control Power Up/Down Sequencing with Different Delays and Slopes**

## PowerArchitect – Configuration Software

MaxLinear's PowerArchitect interactive design tool enables you to create a complete 4- to 6-channel optimized power supply design with complex sequencing and advanced power management features, all with a few clicks of the mouse. A free download of PowerArchitect is available at [powerxr.exar.com](http://powerxr.exar.com)



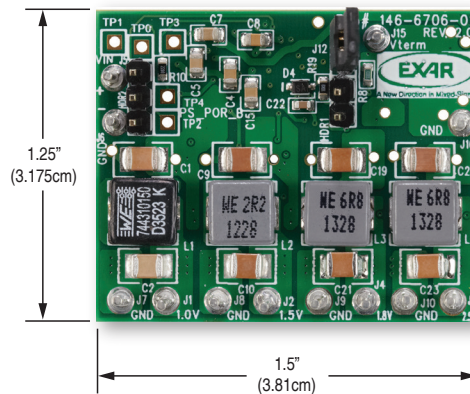
## Evaluation Boards

Evaluation boards for all programmable power management devices are available, along with their user manuals.

### Complete Programmable Power Kits Available



### Zynq-7000 Power System Featuring XRP7714



Ready-made configurations for:

- Zynq-7XXX
- i.MX5 and i.MX6
- Smartfusion2
- Cyclone IV
- Cyclone V SOC
- Intel Wellsburg

## Power Management Solutions for Xilinx® Zynq® UltraScale+™ MPSoC

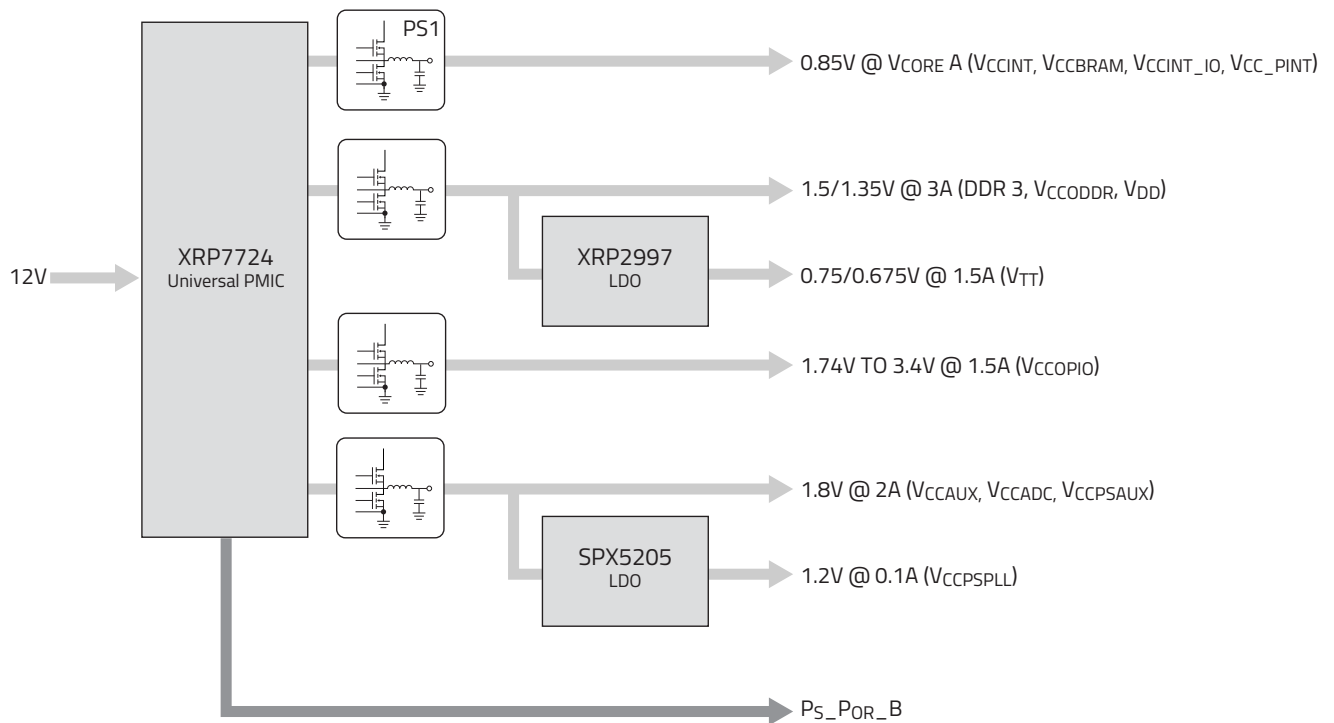
MaxLinear offers two power management solutions for use with Xilinx Zynq UltraScale+ MPSoC. These solutions reduce rails to as few as possible yet still meet the UltraScale+ spec. These flexible solutions use internal digital control to easily manage sequencing requirements and allow max current to be adjusted quickly and easily. Visit [www.exar.com/xilinx](http://www.exar.com/xilinx) for additional information.

### Supported Xilinx UltraScale+ Zynq Devices:

ZU2CG, ZU2EG (A), ZU3CG, ZU3EG, ZU4CG, ZU4EG, ZU4EV, ZU5CG, ZU5EG, ZU5EV, ZU6CG, ZU6EG, ZU7CG, ZU7EG, ZU7EV, ZU9CG, ZU9EG, ZU11EG, ZU15EG, ZU17EG, ZU19EG.

### Features

- **Manages sequence and dependency**
- **Provides correctly timed Ps\_Por\_B**
- **Allows PSU Telemetry**
- **Scalable to meet full Zynq UltraScale+ Family**
- **Optimized to power FPGAs in any system**



### Scalable Zynq UltraScale+ Always on Solution (No MGTs)

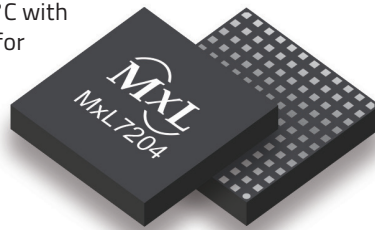
| Device                    | Icore (max) | Imgtavtt | Imgtavcc | PS1             |             |            |                     |
|---------------------------|-------------|----------|----------|-----------------|-------------|------------|---------------------|
|                           |             |          |          | Qh              | Ql          | L          | C                   |
| Zu2, Zu3                  | 8A          | 3A       | 3A       | FDP8014S (dual) |             | 0.56µH 18A | 600µF<br>3mΩ esr    |
| Zu4, Zu5                  | 16A         | 3A       | 3A       | FDM3620S (dual) |             | 0.22µH 33A | 1200µF<br>1.6mΩ esr |
| Zu6, Zu7, Zu9             | 25A         | 3A       | 3A       | CSD17304Q3      | BSC009NE2LS | 0.18µH 50A | 1850µF<br>1.2mΩ esr |
| Zu11, Zu15,<br>Zu17, Zu19 | 35A         | 10A      | 10A      | CSD17304Q4      | BSC009NE2LS | 0.15µH 80A | 2600µF<br>0.9mΩ esr |



## Power Modules

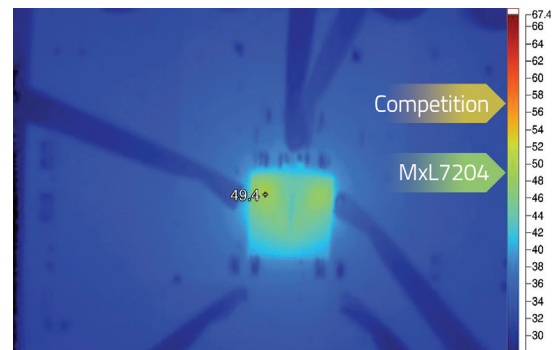
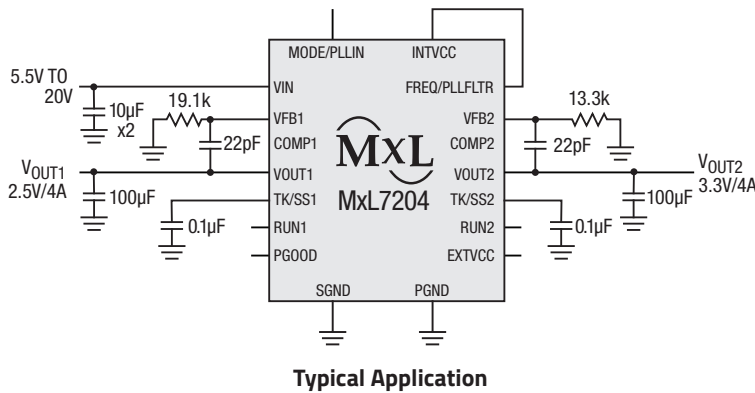
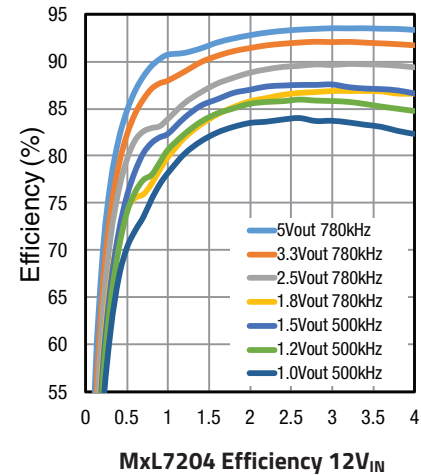
MaxLinear's power modules address high-current solutions for various end applications. These synchronous step-down power modules are complete system-in-package power management solutions with fully integrated power converters including MOSFETs, inductors and internal input and output capacitors. Our XR79xxx modules utilize a patented emulated current mode Constant On-Time (COT) control that provides exceptional full range 0.1% line regulation and 1% output accuracy over the full temperature range. This COT control loop enables operation with ceramic output capacitors, eliminating loop compensation components.

Our QFN modules provide superior thermal performance and manufacturability, all in the smallest footprint. The QFN package makes visual inspection of solder joints possible and eases electrical debugging. At 85°C with no airflow, no thermal de-ratings are required for output voltages of 1.8V and below.



### Applications

- FPGA, DSP and ASIC power systems
- Base stations
- Repeaters
- Networking
- Telecommunications
- Industrial and embedded systems



| Part Number | Ch. | Output Current (A) | V <sub>IN</sub> Range (V) | V <sub>OUT</sub> Range (V) | Frequency (kHz) | Efficiency (%) | X-Y Dimension (mm) | Z Dimension (mm) | Package | Features   |
|-------------|-----|--------------------|---------------------------|----------------------------|-----------------|----------------|--------------------|------------------|---------|--|
| XR79203     | 1   | 3                  | 3 to 40                   | 0.6 to 13.2                | 400 to 800      | 95             | 8 x 8              | 4                | QFN     | <ul style="list-style-type: none"> <li>▪ Patented COT control</li> <li>▪ UVLO, OTP, soft-start, adjustable hiccup current limit and short-circuit protection</li> <li>▪ PGOOD</li> </ul>   |
| XR79206     |     | 6                  | 3 to 40                   | 0.6 to 13.2                | 400 to 800      | 95             | 10 x 10            |                  |         |  |
| XR79103     |     | 3                  | 3 to 22                   | 0.6 to 5.5                 | 600 to 800      | 95             | 6 x 6              |                  |         |  |
| XR79106     |     | 6                  | 3 to 22                   | 0.6 to 5.5                 | 600 to 800      | 95             | 8 x 8              |                  |         |  |
| XR79110     |     | 10                 | 3 to 22                   | 0.6 to 5.5                 | 400 to 800      | 96             | 10 x 10            |                  |         |  |
| XR79115     |     | 15                 | 3 to 22                   | 0.6 to 5.5                 | 400 to 600      | 96             | 12 x 12            |                  |         |  |
| XR79120     |     | 20                 | 3 to 22                   | 0.6 to 5.5                 | 400 to 600      | 93             | 12 x 14            |                  |         |  |
| MxL7204     | 2   | 4                  | 4.5 to 20                 | 0.6 to 5.0                 | 250 to 780      | 93             | 15 x 15            | 2.82             | LGA     | <ul style="list-style-type: none"> <li>▪ PFM</li> <li>▪ Adjustable frequency</li> <li>▪ UVLO, OTP, soft-start, and over current/over voltage/short-circuit protection</li> <li>▪ Frequency synchronization</li> <li>▪ PGOOD</li> </ul> |

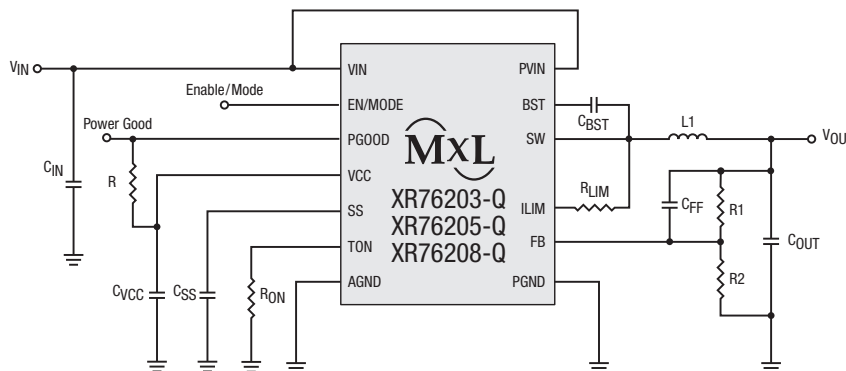
**AEC-Q100 Qualified Step-Down Switching Regulators**

This family of synchronous step-down regulators combine the controller, drivers, bootstrap diode and MOSFETs in a single package for point-of-load supplies well suited for automotive applications.

**Applications**

- Automotive infotainment
- Advanced Driver Assistance Systems (ADAS)
- GPS / Navigation systems
- Event data recorders
- Automotive systems

| Part Number | Output Current (A) | Frequency (kHz) | Operating Voltage (V) |     | Output Voltage | Output Voltage Range (V) |     | Accuracy (%) | Efficiency (%) | Package (mm) | Features  |
|-------------|--------------------|-----------------|-----------------------|-----|----------------|--------------------------|-----|--------------|----------------|--------------|---|
|             |                    |                 | Min                   | Max |                | Min                      | Max |              |                |              |   |
| XR76203-Q   | 3                  | 100 to 800      | 3                     | 40  | Adj.           | 0.6                      | 30  | 0.5          | 95             | 5x5 QFN      | <ul style="list-style-type: none"> <li>▪ AEC-Q100 Qualified Automotive</li> <li>▪ Patented COT control</li> <li>▪ UVLO, OTP, soft-start, hiccup, PGOOD</li> <li>▪ Current limit and short protection</li> </ul> |
| XR76205-Q   | 5                  |                 |                       |     |                |                          |     |              | 96             |              |   |
| XR76208-Q   | 8                  |                 |                       |     |                |                          |     |              | 96             |              |   |



3A, 5A, 8A Step-Down Regulator

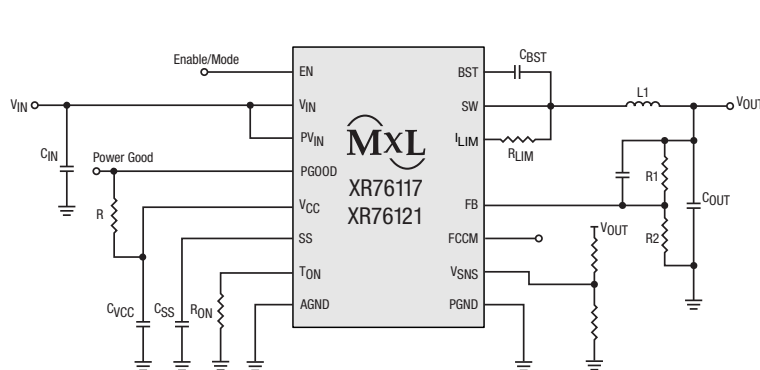
## Step-Down Regulators >20V

Exar's family of synchronous and non-synchronous step-down regulators provides a fully integrated single-chip solution for Point-of-Load (POL) applications with high current output requirements. With high input voltage range and operating switching frequency options, these regulators fit in a wide range of applications and power architectures by enabling step-down DC/DC conversions from various intermediate power bus levels and providing a highly efficient and high performing solution in the most compact footprint.

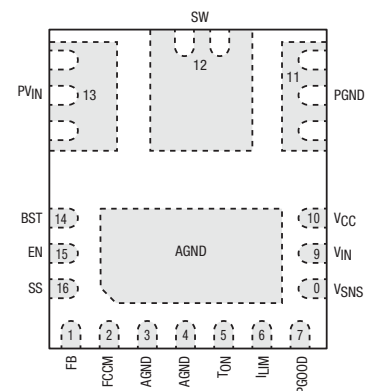
### Applications

- Distributed power architectures
- Point-of-Load (POL) converters
- Point-of-Load (POL) modules
- FPGAs, DSPs and processor power supplies

| Part Number        | Output Current (A) | Frequency (kHz) | Operating Voltage (V) |     | Output Voltage | Output Voltage Range (V) |      | Accuracy (%) | Efficiency (%) | Package (mm) | Features   |
|--------------------|--------------------|-----------------|-----------------------|-----|----------------|--------------------------|------|--------------|----------------|--------------|--|
|                    |                    |                 | Min                   | Max |                | Min                      | Max  |              |                |              |  |
| XR76203            | 3                  | 100 to 800      | 3                     | 40  | Adj.           | 0.6                      | 30   | 0.5          | 95             | 5 x 5 QFN    | <ul style="list-style-type: none"> <li>▪ Patented COT control</li> <li>▪ UVLO, OTP, soft-start, hiccup, PGOOD</li> <li>▪ Current limit and short protection</li> </ul> |
| XR76205            | 5                  |                 |                       |     |                |                          |      |              |                |              |  |
| XR76208            | 8                  |                 |                       |     |                |                          |      |              |                |              |  |
| SP7650             | 3                  | 300             | 2.5                   | 28  | Adj.           | 0.8                      | 27   | 1            | 95             | 7 x 4 DFN    | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ UVLO, OTP, soft-start</li> <li>▪ Short-circuit protection/auto-restart</li> </ul>                      |
| SP7652             | 6                  | 600             | 2.5                   | 28  | Adj.           | 0.8                      | 27   | 1            | 92             | 7 x 4 DFN    | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ UVLO, OTP, soft-start</li> <li>▪ Short-circuit protection/auto-restart</li> </ul>                      |
| SP7662/<br>XRP7662 | 12                 | 300             | 3                     | 22  | Adj.           | 0.8                      | 20.2 | 1            | 93             | 7 x 4 DFN    | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ UVLO, OTP, soft-start, current limiting</li> <li>▪ Short-circuit protection/auto-restart</li> </ul>    |
| XR76108            | 8                  | 200 to 800      | 3                     | 22  | Adj.           | 0.6                      | 18   | 0.5          | 96             | 5 x 5 QFN    | <ul style="list-style-type: none"> <li>▪ Patented COT control</li> <li>▪ UVLO, OTP, soft-start, hiccup, PGOOD</li> <li>▪ Current limit and short protection</li> </ul> |
| XR76112            | 12                 |                 |                       |     |                |                          |      |              |                |              |  |
| XR76115            | 15                 |                 |                       |     |                |                          |      |              |                |              |  |
| XR76117            | 15                 | 200 to 800      | 4.5                   | 22  | Adj.           | 0.6                      | 18   | 0.5          | 97             | 5 x 6 QFN    | <ul style="list-style-type: none"> <li>▪ Patented COT control</li> <li>▪ UVLO, OTP, soft-start, hiccup, PGOOD</li> <li>▪ Current limit and short protection</li> </ul> |
| XR76121            | 20                 | 200 to 800      | 4.5                   | 22  | Adj.           | 0.6                      | 18   | 0.5          | 97             | 5 x 6 QFN    | <ul style="list-style-type: none"> <li>▪ Patented COT control</li> <li>▪ UVLO, OTP, soft-start, hiccup, PGOOD</li> <li>▪ Current limit and short protection</li> </ul> |
| SP7651             | 3                  | 900             | 2.5                   | 20  | Adj.           | 0.8                      | 19   | 1            | 92             | 7 x 4 DFN    | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ UVLO, OTP, soft-start</li> <li>▪ Short-circuit protection/auto-restart</li> </ul>                      |



15A and 20A Step-Down Regulator



XR76121 Pin Assignment

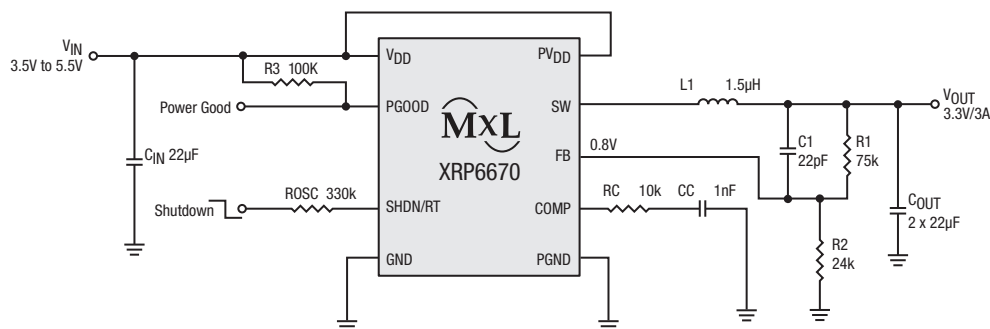
Step-Down Regulators

Step-down regulators, also known as buck regulators, are used to lower the input voltage to the desired output level with higher efficiency than an LDO. A step-down regulator integrates power FET ICs, providing a monolithic power converter.

Applications

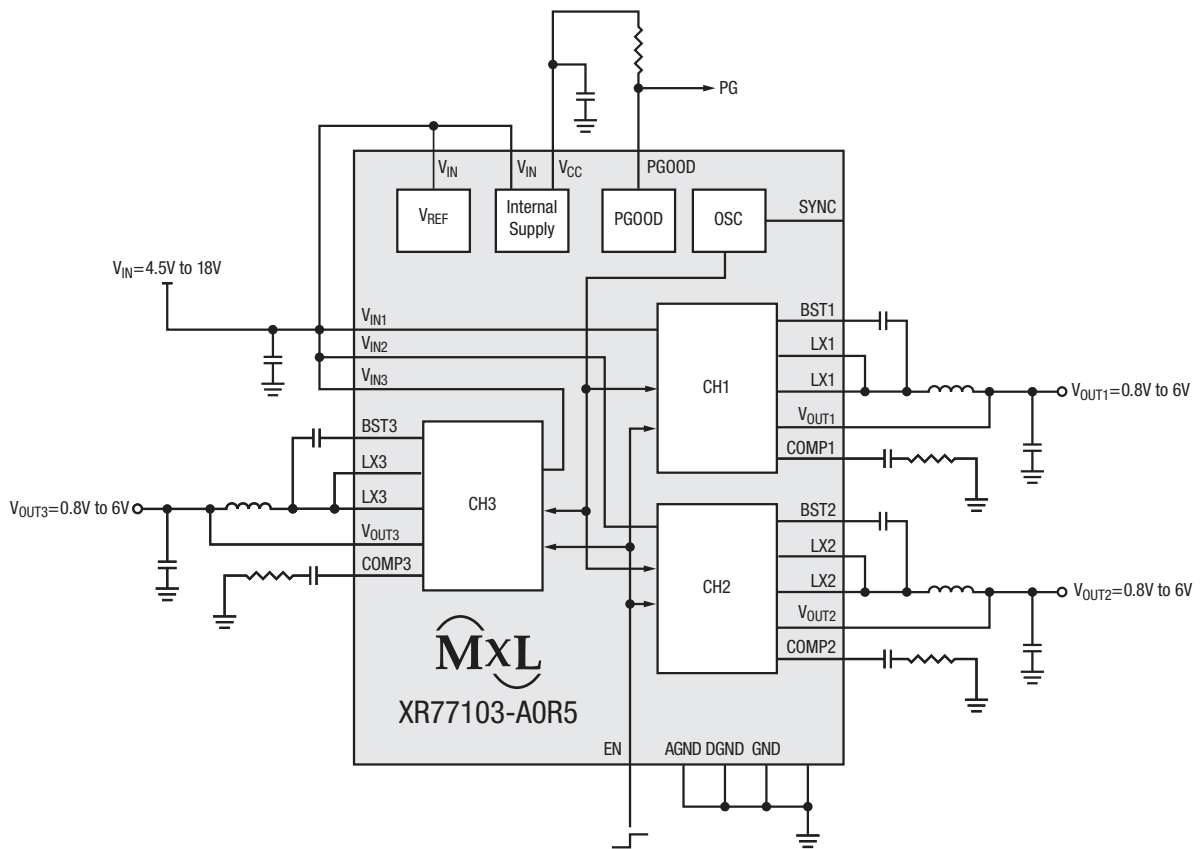
- Distributed power architectures
- Point-of-Load (POL) converters
- Point-of-Load (POL) modules
- FPGAs, DSPs and processor power supplies

| Part Number | Ch. | Output Current | Frequency Mode (MHz) | Operating Voltage (V) |     | Output Voltage | Output Voltage Range (V) |     | Quiescent Current (µA) | Efficiency (%) | Package | Features  |
|-------------|-----|----------------|----------------------|-----------------------|-----|----------------|--------------------------|-----|------------------------|----------------|---------|---|
|             |     |                |                      | Min                   | Max |                | Min                      | Max |                        |                |         |   |
| SP6669      | 1   | 600mA          | 1.5                  | 2.5                   | 5.5 | Adj.           | 0.6                      | 5   | 200                    | 95             | SOT23-5 | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ Enable pin</li> <li>▪ Pulse skipping at light load</li> <li>▪ Over temperature protection</li> </ul>                                    |
| SP6654      | 1   | 800mA          | PFM                  | 2.7                   | 5.5 | Adj.           | 0.8                      | 5   | 20                     | 98             | DFN-10  | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ Enable pin</li> <li>▪ Power good indicator</li> <li>▪ Adjustable UVLO, over temperature protection</li> </ul>                           |
| SP6652      | 1   | 1A             | 1.4                  | 2.7                   | 5.5 | Adj.           | 0.75                     | 5   | 1mA                    | 97             | MSOP-10 | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ Enable pin, soft-start</li> <li>▪ External clock synchronization</li> <li>▪ Overcurrent and over temperature protection</li> </ul>      |
| XRP6658     | 1   | 1A             | 1.5                  | 2.5                   | 5.5 | Adj.           | 0.6                      | 5   | 15                     | 97             | SOT23-5 | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ Light load efficiency, PFM and PWM mode</li> <li>▪ Enable pin</li> <li>▪ UVLO and over temperature protection</li> </ul>                |
| SP34063     | 1   | Adj. <1.5A     | 0.11                 | 3                     | 36  | Adj.           | 1                        | 27  | 4mA                    | 80             | NSOIC-8 | <ul style="list-style-type: none"> <li>▪ Can be implemented in buck, boost or inverting topologies</li> </ul>   |
| XRP6657     | 1   | 1.5A           | 1.3                  | 2.5                   | 5.5 | Adj.           | 0.6                      | 5   | 240                    | 95             | DFN-6   | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ Enable pin</li> <li>▪ Pulse skipping at light load</li> <li>▪ Over temperature protection</li> </ul>                                    |
| XRP7659     | 1   | 1.5A           | 1.4                  | 4.5                   | 18  | Adj.           | 0.81                     | 15  | 800                    | 92             | SOT23-6 | <ul style="list-style-type: none"> <li>▪ Non synchronous</li> <li>▪ Enable pin, soft-start</li> <li>▪ Internal compensation</li> <li>▪ Overcurrent, over temperature and UVLO protection</li> </ul>     |
| XRP7664     | 1   | 2A             | 0.3                  | 4.5                   | 18  | Adj.           | 0.925                    | 16  | 1.2mA                  | 95             | SOIC-8  | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ UVLO, OTP, soft-start</li> <li>▪ Light load efficiency and PWM mode</li> <li>▪ Overcurrent and output overvoltage protection</li> </ul> |
| XRP6670     | 1   | 3A             | Prog. 0.3 to 2.5     | 2.6                   | 5.5 | Adj.           | 0.8                      | 5   | 460                    | 95             | DFN-10  | <ul style="list-style-type: none"> <li>▪ Synchronous, programmable frequency</li> <li>▪ Enable pin, Power Good flag</li> <li>▪ OTP, OCP and UVLO protection</li> </ul>                                  |



3A Synchronous Step-Down Regulator

| Part Number  | Ch. | Output Current | Frequency Mode (MHz) | Operating Voltage (V) |     | Output Voltage | Output Voltage Range (V) |     | Quiescent Current ( $\mu$ A) | Efficiency (%) | Package | Features   |
|--------------|-----|----------------|----------------------|-----------------------|-----|----------------|--------------------------|-----|------------------------------|----------------|---------|--|
|              |     |                |                      | Min                   | Max |                | Min                      | Max |                              |                |         |  |
| XRP7665      | 1   | 3A             | 0.34                 | 4.5                   | 18  | Adj.           | 0.925                    | 16  | 1.2mA                        | 95             | HSOIC-8 | <ul style="list-style-type: none"> <li>Synchronous</li> <li>UVLO, OTP, soft-start</li> <li>Light load efficiency, PFM and PWM mode</li> <li>Overcurrent and output overvoltage protection</li> </ul> |
| XRP7675      | 1   | 3A             | 0.34                 | 4.5                   | 18  | Adj.           | 0.925                    | 16  | 1.2mA                        | 95             | HSOIC-8 | <ul style="list-style-type: none"> <li>Synchronous</li> <li>UVLO, OTP, soft-start</li> <li>Light load efficiency, PFM and PWM mode</li> <li>Overcurrent and output overvoltage protection</li> </ul> |
| XRP6668      | 2   | 1A/1A          | 1.5                  | 2.5                   | 5.5 | Adj.           | 0.6                      | 5   | 30                           | 97             | NSOIC-8 | <ul style="list-style-type: none"> <li>Synchronous</li> <li>Light load efficiency, PFM and PWM mode</li> <li>Individual enable pin</li> <li>UVLO and over temperature protection</li> </ul>          |
| XR77103-A1R0 | 3   | 2A             | 1                    | 4.5                   | 14  | Adj.           | 0.8                      | 6   | 2.8mA                        | 93             | TQFN-32 | <ul style="list-style-type: none"> <li>Synchronous</li> <li>UVLO, OTP, soft-start</li> <li>Light load efficiency, PSM and PWM mode</li> <li>Overcurrent and output overvoltage protection</li> </ul> |
| XR77103-AOR5 | 3   | 2A             | 0.5                  | 4.5                   | 14  | Adj.           | 0.8                      | 6   | 2.6mA                        | 93             | TQFN-32 | <ul style="list-style-type: none"> <li>Synchronous</li> <li>UVLO, OTP, soft-start</li> <li>Light load efficiency, PSM and PWM mode</li> <li>Overcurrent and output overvoltage protection</li> </ul> |



**3-Output Synchronous Buck Regulator**



Step-Up Regulators

Step-up regulators, also known as boost regulators, are used to step up an input voltage to the desired higher output level. They are typically used in portable equipment where the power supply is provided by a battery.

Applications

- Handheld and portable equipment
- Bias supplies

| Part Number | Output Current | Operating Voltage (V) |     | Startup Voltage (V) | Output Voltage | Output Voltage Range (V) |      | Quiescent Current (µA) | Efficiency (%) | Package          | Features   |
|-------------|----------------|-----------------------|-----|---------------------|----------------|--------------------------|------|------------------------|----------------|------------------|--|
|             |                | Min                   | Max |                     |                | Min                      | Max  |                        |                |                  |  |
| SP6641A     | 100mA          | 0.9                   | 4.5 | 0.85                | Fixed          | 3.3                      |      | 10                     | 87             | SOT23-5          | <ul style="list-style-type: none"> <li>▪ Non synchronous</li> <li>▪ Enable pin</li> <li>▪ Current limiting</li> </ul>  |
|             |                |                       |     |                     | Fixed          | 5                        |      |                        |                |                  |  |
| SP6661      | 200mA          | 1.5                   | 5.3 | n/a                 | Inverter       | -5                       | -1.5 | 3mA                    | 89             | SOIC-8<br>MSOP-8 | <ul style="list-style-type: none"> <li>▪ Charge pump topology</li> <li>▪ Selectable oscillator</li> <li>▪ External oscillator input</li> </ul>                                 |
|             |                | 2.5                   | 5.3 |                     | Doubler        | 5                        | 10   |                        | 94             |                  |  |
| SP6648      | 400mA          | 0.7                   | 4.5 | 0.85                | Adj.           | 2.5                      | 5.5  | 13                     | 94             | MSOP-10          | <ul style="list-style-type: none"> <li>▪ Synchronous</li> <li>▪ Enable pin</li> <li>▪ Programmable low battery detection</li> <li>▪ Undervoltage lockout protection</li> </ul> |
| SP6641B     | 500mA          | 0.9                   | 4.5 | 0.85                | Fixed          | 3.3                      |      | 10                     | 87             | SOT23-5          | <ul style="list-style-type: none"> <li>▪ Non synchronous</li> <li>▪ Enable pin</li> <li>▪ Current limiting</li> </ul>  |
|             |                |                       |     |                     | Fixed          | 5                        |      |                        |                |                  |  |
| SP34063     | Adj. <1.5A     | 3                     | 36  | n/a                 | Adj.           | 1                        | 27   | 4mA                    | 80             | NSOIC-8          | <ul style="list-style-type: none"> <li>▪ Can be implemented in buck, boost or inverting topologies</li> </ul>  |

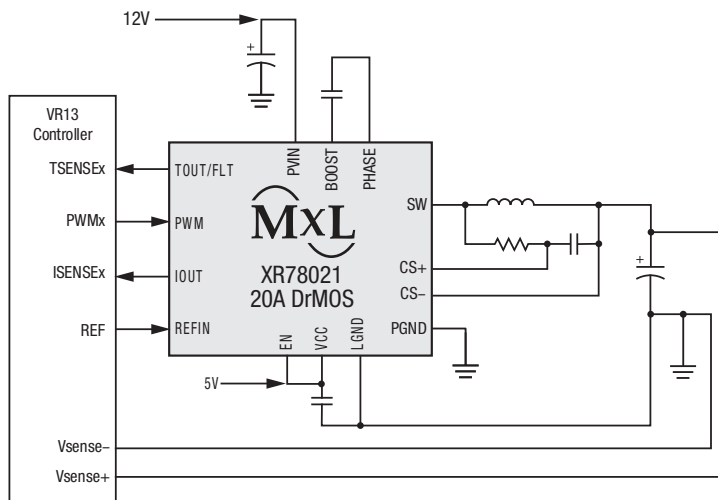
Advanced DrMOS

This integrated power stage contains a synchronous buck gate driver packaged with both half bridge MOSFETs. Also known as DrMOS (Driver plus MOSFETs), this package design provides very low thermal impedance and minimizes parasitic inductances resulting in excellent EMI performance.

Applications

- Servers
- Networking equipment
- Industrial PC

| Part Number | I <sub>out</sub> (A) | V <sub>IN</sub> MIN (V) | V <sub>IN</sub> MAX (V) | V <sub>OUT</sub> MAX (V) | Minimum On-Time (ns) | Switching Frequency (kHz) | Efficiency (%) [V <sub>IN</sub> =12V, V <sub>OUT</sub> = 1V, full load, 600kHz] | Junction Temp Range (°C) | Package | Features   |
|-------------|----------------------|-------------------------|-------------------------|--------------------------|----------------------|---------------------------|---|--------------------------|---------|--|
| XR78021     | 20A                  | 4.5                     | 17                      | 3.3                      | 30                   | 1500                      | 84  | -40 to 125               | QFN     | <ul style="list-style-type: none"> <li>▪ UVLO, TMON, IMON</li> </ul> |



XR78021 Typical Application

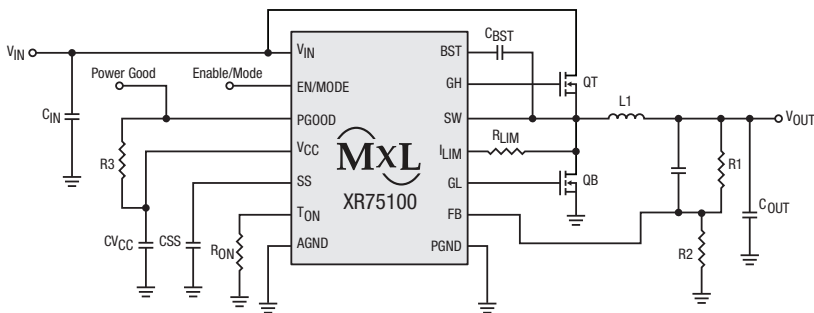
## Switching Controllers

Switching controllers, also known as buck controllers or Step-down, are the basic building blocks for high efficiency and high power point-of-loads. Step-down controllers allow maximum flexibility and customization for high performance conversions.

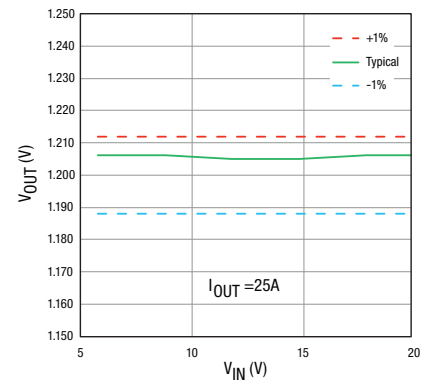
### Applications

- Distributed power architectures
- Point-of-Load (POL) converters/modules
- Set-top boxes

| Part Number | Rec. Output Current (A) | Operating Voltage (V) |     | Min. Output Voltage (V) | Quiescent Current ( $\mu$ A) | Frequency (kHz) | Efficiency (%) | Package  | Features   |
|-------------|-------------------------|-----------------------|-----|-------------------------|------------------------------|-----------------|----------------|----------|--|
|             |                         | Min                   | Max |                         |                              |                 |                |          |  |
| XR75100     | <20                     | 3                     | 40  | 0.6                     | 700                          | 200 to 800      | 96             | QFN-16   | <ul style="list-style-type: none"> <li>▪ Proprietary emulated current mode constant on-time architecture</li> <li>▪ No external compensation</li> <li>▪ Adjustable frequency</li> <li>▪ Precision enable, soft-start, force PWM</li> <li>▪ Adjustable temperature compensated current limit</li> </ul> |
| XRP6124     | <5                      | 3                     | 18  | 1.2                     | 500                          | 200 to 1000     | 92             | SOT23-5  | <ul style="list-style-type: none"> <li>▪ Non synchronous, 500ns constant on-time</li> <li>▪ Enable pin, soft-start</li> <li>▪ UVLO and output short-circuit protection</li> </ul>  |
| XRP6124HV   |                         | 4.5                   | 30  |                         |                              |                 |                |          |  |
| SP6134H     | <15                     | 3                     | 28  | 0.8                     | 1.5mA                        | 600             | 94             | MSOP-10  | <ul style="list-style-type: none"> <li>▪ Synchronous voltage mode PWM</li> <li>▪ Programmable soft-start</li> <li>▪ UVLO, over temperature and output short-circuit protection</li> </ul>  |
| SP6132H     | <20                     | 3                     | 28  |                         |                              | 300             | 95             |          |  |
| SP6133      | <30                     | 3                     | 24  | 0.8                     | 1.5mA                        | 300             | 95             | QFN-16   | <ul style="list-style-type: none"> <li>▪ Synchronous voltage mode PWM</li> <li>▪ Enable pin, Power Good flag indicator</li> <li>▪ Programmable soft-start, current limiting</li> <li>▪ UVLO, over temperature and output short-circuit protection</li> </ul>   |
| XRP6141     | <35                     | 3                     | 22  | 0.6                     | 700                          | 200 to 800      | 95             | QFN-16   | <ul style="list-style-type: none"> <li>▪ Proprietary emulated current mode constant on-time architecture</li> <li>▪ No external compensation</li> <li>▪ Adjustable frequency</li> <li>▪ Precision enable, soft-start, force PWM</li> <li>▪ Adjustable temperature compensated current limit</li> </ul> |
| SP6123      | <10                     | 3                     | 5.5 | 0.8                     | 500                          | 300             | 95             | NSOIC-8  | <ul style="list-style-type: none"> <li>▪ Synchronous voltage mode PWM</li> <li>▪ Soft-start, on/off mode</li> <li>▪ UVLO and overcurrent protection</li> </ul>   |
| SP6128A     | <10                     | 3                     | 5.5 | 0.8                     | 500                          | 300             | 95             | TSSOP-14 | <ul style="list-style-type: none"> <li>▪ Synchronous voltage mode PWM</li> <li>▪ Soft-start, on/off mode</li> <li>▪ UVLO and overcurrent protection</li> </ul>   |



40V Synchronous Step-Down COT Controller



XR75100 Line Regulation

### DDR Termination

| Part Number | Output Current | Output Voltage | Accuracy (%) | Operating Voltage (V) |     | Quiescent Current (μA) | Package | Features   |
|-------------|----------------|----------------|--------------|-----------------------|-----|------------------------|---------|--|
|             |                |                |              | Min                   | Max |                        |         |  |
| XRP2997     | 2A             | Adjustable     | 1            | 1.1                   | 5.5 | 2                      | HSOIC-8 | <ul style="list-style-type: none"> <li>▪ DDR I/II/III/IV bus termination</li> <li>▪ Over temperature protection</li> <li>▪ Overcurrent protection</li> </ul> |

### Linear Regulators

| Part Number | Output Current (mA) | Output Voltage (V) | Accuracy (%) | Operating Voltage (V) |     | Quiescent Current (mA) | Package | Features  |
|-------------|---------------------|--------------------|--------------|-----------------------|-----|------------------------|---------|---|
|             |                     |                    |              | Min                   | Max |                        |         |   |
| SP78L05     | 100                 | 5                  | 5            | 7.5                   | 18  | 1.5                    | NSOIC-8 | <ul style="list-style-type: none"> <li>▪ Over temperature protection</li> <li>▪ Short-circuit protection</li> </ul> |

LDOs

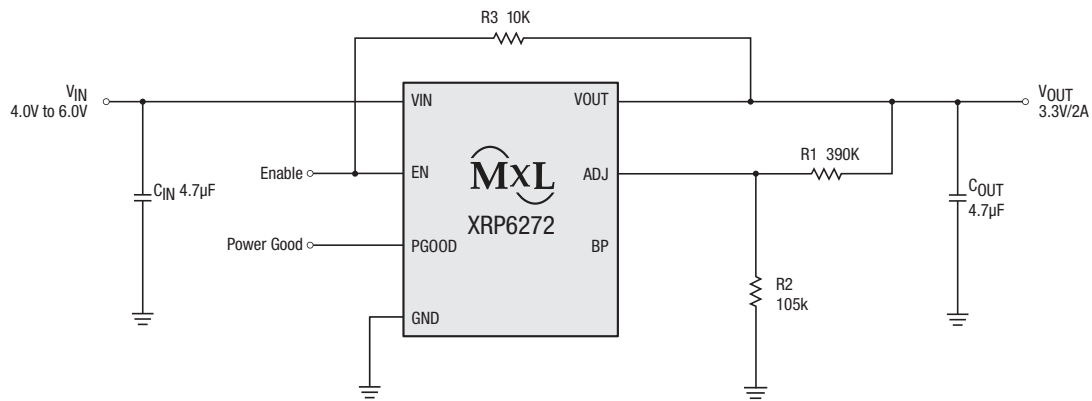
Exar manufactures a broad line of low dropout linear regulators (LDO). The simplest and lowest cost technique for stepping down a DC voltage, LDOs offer a quiet, well-regulated DC voltage supply with excellent transient response.

Applications

- Portable equipment
- Handheld devices
- Mobile phones and PDAs
- Medical and industrial instrumentation

| Part Number | Output Current | Output Voltage (V)                  | V <sub>OUT</sub> (V) Adjustable |        | Accuracy (%) | Typical Dropout Voltage (mV) | Operating Voltage (V) |     | Quiescent Current (µA) | Package             | Features   |
|-------------|----------------|-------------------------------------|---------------------------------|--------|--------------|------------------------------|-----------------------|-----|------------------------|---------------------|--|
|             |                |                                     | Min                             | Max    |              |                              | Min                   | Max |                        |                     |  |
| SP6213      | 100mA          | 3.3                                 |                                 |        | 2.5          | 250                          | 2.5                   | 7   | 65                     | SC70-5              | <ul style="list-style-type: none"> <li>▪ Enable pin</li> <li>▪ Current limiting and thermal protection</li> </ul>  |
| LP2951      | 100mA          | 3.3, 5                              |                                 |        | 0.5, 1       | 380                          | 2.4                   | 30  | 150                    | NSOIC-8             | <ul style="list-style-type: none"> <li>▪ Enable pin</li> <li>▪ Output error flag indicator</li> <li>▪ Current limiting and thermal protection</li> </ul>   |
| SPX5205     | 150mA          | Adj., 1.8, 3, 3.3, 5                | 1.24                            | 15.725 | 1            | 210                          | 2.5                   | 16  | 70                     | SOT23-5             | <ul style="list-style-type: none"> <li>▪ Reverse battery protection</li> <li>▪ Current limiting and thermal protection</li> </ul>  |
| SP6201      | 200mA          | 1.8, 3, 3.3, 5                      |                                 |        | 2            | 320                          | 2.5                   | 7   | 28                     | SOT23-5             | <ul style="list-style-type: none"> <li>▪ Enable pin</li> <li>▪ Power good indicator</li> </ul>   |
| SP6260      | 200mA          | 3.3                                 |                                 |        | 2            | 200                          | 2                     | 6   | 25                     | SOT23-5             | <ul style="list-style-type: none"> <li>▪ Low noise: 30µV<sub>RMS</sub>, no bypass cap needed</li> <li>▪ Enable pin</li> <li>▪ Current limiting and thermal protection</li> </ul>                   |
| SPX2954     | 250mA          | 5                                   |                                 |        | 0.5          | 310                          | 2.4                   | 30  | 150                    | NSOIC-8<br>SOT223-3 | <ul style="list-style-type: none"> <li>▪ Enable pin</li> <li>▪ Output error flag indicator</li> <li>▪ Current limiting and thermal protection</li> </ul>   |
|             |                | 3.3, 5                              |                                 |        | 1            |                              |                       |     |                        | NSOIC-8<br>SOT223-3 |  |
| SP6203      | 300mA          | 2.8                                 |                                 |        | 2            | 180                          | 2.7                   | 6   | 45                     | SOT23-5             | <ul style="list-style-type: none"> <li>▪ Low noise: 12µV<sub>RMS</sub></li> <li>▪ Enable pin</li> <li>▪ Current limiting and thermal protection</li> </ul>   |
| SPX2945     | 400mA          | 3.3                                 |                                 |        | 0.5, 1       | 420                          | 4.1                   | 30  | 100                    | SOT223-3            | <ul style="list-style-type: none"> <li>▪ Enable pin</li> <li>▪ Output error flag indicator</li> <li>▪ Current limiting and thermal protection</li> </ul>   |
| SP6205      | 500mA          | Adj., 3, 3.3                        | 2.7                             | 5.7    | 2            | 300                          | 2.7                   | 6   | 45                     | SOT23-5             | <ul style="list-style-type: none"> <li>▪ Low noise: 12µV<sub>RMS</sub> (fixed voltage version)</li> <li>▪ Enable pin</li> <li>▪ Current limiting</li> <li>▪ Over temperature protection</li> </ul> |
|             |                | Adj.                                |                                 |        |              |                              |                       |     |                        | DFN-8               |  |
| SPX3819     | 500mA          | Adj., 1.2, 1.5, 1.8, 2.5, 3, 3.3, 5 | 1.235                           | 15.45  | 1            | 340                          | 2.5                   | 16  | 90                     | SOT23-5             | <ul style="list-style-type: none"> <li>▪ Enable pin</li> <li>▪ Reverse battery protection</li> <li>▪ Current limiting and thermal protection</li> </ul>  |
|             |                | Adj., 1.2                           |                                 |        |              |                              |                       |     |                        | DFN-8               |  |
|             |                | Adj., 5                             |                                 |        |              |                              |                       |     |                        | NSOIC-8             |  |
| SPX1117     | 800mA          | Adj., 1.5, 1.8, 2.5, 3.3, 5         | 1.25                            | 15     | 1            | 1100                         | 2.6                   | 15  | 5mA                    | SOT223-3            | <ul style="list-style-type: none"> <li>▪ Current limiting and thermal protection</li> </ul>  |
| SPX2941     | 1A             | Adj.                                | 1.24                            | 15.45  | 3            | 280                          | 3                     | 16  | 12mA                   | TO263-5             | <ul style="list-style-type: none"> <li>▪ Enable pin</li> <li>▪ Reverse battery protection</li> <li>▪ Current limiting and thermal protection</li> </ul>  |
| SPX3940A    | 1A             | 3.3, 5                              |                                 |        | 1            | 280                          | 3.1                   | 16  | 18mA                   | SOT223-3            | <ul style="list-style-type: none"> <li>▪ Reverse battery protection</li> <li>▪ Current limiting and thermal protection</li> </ul>  |
|             |                | 3.3                                 |                                 |        | 2            |                              |                       |     |                        | TO263-3             |  |
| SPX3940     | 1A             | 2.5, 5                              |                                 |        | 2            |                              |                       |     |                        | SOT223-3            |  |
|             |                | 3.3                                 |                                 |        |              |                              |                       |     |                        | TO263-3             |  |
| SPX2815     | 1.5A           | Adj., 3.3                           | 1.25                            | 8.8    | 1, 2         | 1100                         | 2.5                   | 10  | 4mA                    | TO263-3             | <ul style="list-style-type: none"> <li>▪ Current limiting and thermal protection</li> </ul>  |

| Part Number | Output Current | Output Voltage (V) | V <sub>OUT</sub> (V) Adjustable |      | Accuracy (%) | Typical Dropout Voltage (mV) | Operating Voltage (V) |     | Quiescent Current (μA) | Package         | Features   |
|-------------|----------------|--------------------|---------------------------------|------|--------------|------------------------------|-----------------------|-----|------------------------|-----------------|--|
|             |                |                    | Min                             | Max  |              |                              | Min                   | Max |                        |                 |  |
| SPX29150    | 1.5A           | 3.3, 5.0           |                                 |      | 1            | 390                          | 2.5                   | 16  | 12mA                   | TO263-3         | <ul style="list-style-type: none"> <li>Reverse battery protection</li> <li>Current limiting and thermal protection</li> </ul>                      |
| SPX29152    | 1.5A           | Adj.               | 1.25                            | 15.4 | 1            | 390                          | 2.5                   | 16  | 12mA                   | TO263-5         | <ul style="list-style-type: none"> <li>Enable pin</li> <li>Current limiting and thermal protection</li> </ul>                                      |
| XRP6272     | 2A             | Adj., 5            | 0.7                             | 5.3  | 2            | 550                          | 1.8                   | 6   | 30                     | TO252-5 HSOIC-8 | <ul style="list-style-type: none"> <li>Enable and power good functions</li> <li>Current limiting and thermal protection</li> </ul>                 |
| SPX1582     | 3A             | Adj.               | 1.25                            | 6    | 2            | 400                          | 1.8                   | 5.5 | 5mA                    | TO263-5         | <ul style="list-style-type: none"> <li>Enable pin</li> <li>External sense pin</li> <li>Current limiting and thermal protection</li> </ul>          |
| SPX1587     | 3A             | Adj., 2.5, 3.3     | 1.25                            | 8.8  | 1            | 1100                         | 2.8                   | 10  | 4mA                    | TO263-3         | <ul style="list-style-type: none"> <li>Current limiting</li> <li>Over temperature protection</li> </ul>  |
| SPX29300    | 3A             | 2.5, 3.3, 5        |                                 |      | 1            | 600                          | 2.5                   | 16  | 37mA                   | TO263-3         | <ul style="list-style-type: none"> <li>Current limiting and thermal protection</li> <li>Reverse battery protection</li> </ul>                      |
| SPX29301    | 3A             | 5                  |                                 |      | 1            | 600                          | 4                     | 16  | 37mA                   | TO263-5         | <ul style="list-style-type: none"> <li>Enable pin</li> <li>Output error flag indicator</li> <li>Current limiting and thermal protection</li> </ul> |
| SPX29302    | 3A             | Adj.               | 1.25                            | 16   | 1            | 600                          | 2.8                   | 16  | 37mA                   | TO263-5         | <ul style="list-style-type: none"> <li>Enable pin</li> <li>Current limiting and thermal protection</li> <li>Reverse battery protection</li> </ul>  |



**XRP6272 Typical Application**



## Power Switches

Power switches provide low loss, high efficiency power management, monitoring and fault handling capabilities for any power distribution network. Use of these compact devices results in safer, more stable and more reliable interconnecting systems.

### Applications

- USB  $V_{BUS}$  power management
- Set-top boxes
- USB peripherals
- Battery charger circuits

| Part Number | Channel(s) | Output Current | Current Limit | Operating Voltage (V) |     | Quiescent Current ( $\mu$ A) | Package | Features   |
|-------------|------------|----------------|---------------|-----------------------|-----|------------------------------|---------|--|
|             |            |                |               | Min                   | Max |                              |         |  |
| SP2525A     | 1          | 500mA          | 850mA         | 3                     | 5.5 | 75                           | NSOIC-8 | <ul style="list-style-type: none"> <li>▪ Active high or low enable pin(s)</li> <li>▪ USB 2.0 compliant</li> <li>▪ Current limiting</li> <li>▪ Fault flag indicator(s)</li> <li>▪ Over temperature protection</li> <li>▪ Undervoltage lock out protection</li> </ul>                          |
| SP2526A     | 2          | 500mA          | 850mA         | 3                     | 5.5 | 110                          | NSOIC-8 | <ul style="list-style-type: none"> <li>▪ Active high enable pin</li> <li>▪ Current limiting</li> <li>▪ Short-circuit protection</li> <li>▪ Over temperature protection</li> </ul>  |
| SP619       | 1          | 600mA          | 800mA         | 2.5                   | 5.5 | 350                          | SOT23-6 | <ul style="list-style-type: none"> <li>▪ Active high or low enable pin(s)</li> <li>▪ USB 3.0 compliant</li> <li>▪ Current limiting</li> <li>▪ Blanking fault flag indicator(s)</li> <li>▪ Over temperature/reverse current protection</li> <li>▪ Undervoltage lock out protection</li> </ul> |
| XRP2526     | 2          | 900mA          | 1.15A         | 1.8                   | 5.5 | 65                           | NSOIC-8 | <ul style="list-style-type: none"> <li>▪ Active high or low enable pin(s)</li> <li>▪ USB 2.0 compliant</li> <li>▪ Current limiting</li> <li>▪ Fault flag indicator(s)</li> <li>▪ Over temperature protection</li> <li>▪ Undervoltage lock out protection</li> </ul>                          |

## Voltage References

Voltage references provide a precise and stable output voltage over a wide range of conditions such as input voltage fluctuations and/or operating temperature change. These devices guarantee system accuracy and performance.

### Applications

- Power supplies
- Mother boards
- Medical and industrial instrumentation

| Part Number | $V_{REF}$ (V) | Accuracy (%) | Operating Current (mA) | Max Operating Voltage (V) | $I_{REF}$ ( $\mu$ A) | Operating Temperature Range ( $^{\circ}$ C) | Temperature Coefficient (ppm/ $^{\circ}$ C) | Package | Features  |
|-------------|---------------|--------------|------------------------|---------------------------|----------------------|---|---|---------|---|
| SPX385      | 2.5<br>5      | 1            | 0.01 to 20             | –                         | –                    | -40 to 85                                   | 80  | SOT23-3 | <ul style="list-style-type: none"> <li>▪ Shunt reference</li> <li>▪ Replacement for LM285/385</li> </ul>                            |
| SPX431A     | 2.5           | 0.5          | 1 to 150               | 36                        | 0.7                  | -40 to 125                                  | 30  | SOT89-3 | <ul style="list-style-type: none"> <li>▪ <math>V_{REF}</math> adjustable up to 36V</li> <li>▪ Replaces TL431 and AS431</li> </ul>   |
| SPX431L     | 2.5           | 1            | 1 to 100               | 20                        | 0.7                  | 0 to 105                                    | 30  | SOT89-3 | <ul style="list-style-type: none"> <li>▪ <math>V_{REF}</math> adjustable up to 20V</li> <li>▪ Replaces TL431 and AS431</li> </ul>   |
| SPX432      | 1.24          | 1            | 1 to 80                | 15                        | 3                    | 0 to 105                                    | 50  | SOT23-3 | <ul style="list-style-type: none"> <li>▪ <math>V_{REF}</math> adjustable to 15V</li> <li>▪ Replaces TLV431 and AS432</li> </ul>     |
| SPX1431     | 2.5           | 0.4          | 1 to 150               | 36                        | 0.7                  | -55 to 125                                  | 30  | SOT89-3 | <ul style="list-style-type: none"> <li>▪ <math>V_{REF}</math> adjustable up to 36V</li> <li>▪ Replaces TL1431</li> </ul>            |
| SPX2431     | 2.5           | 0.5, 1       | 1 to 100               | 20                        | 0.7                  | 0 to 105                                    | 30  | SOT23-3 | <ul style="list-style-type: none"> <li>▪ <math>V_{REF}</math> adjustable up to 20V</li> <li>▪ Replaces TL2431 and AS2431</li> </ul> |

Supervisors

Supervisory circuits ensure safe operating conditions for microprocessor and memory-based systems. By monitoring one or more system supplies, supervisory circuits provide basic protection such as power-on reset as well as fault monitoring during power-up, power down and undervoltage (brownout) conditions. Additional functions typically include a watchdog timer, a manual reset and battery backup supply switching.

Applications

- Mother boards
- Telecom and datacom equipment
- Medical and industrial instrumentation

| Part Number | Channel(s) | Reset Threshold (V) | Reset Accuracy | Reset Active | Operating Voltage(V) |     | Quiescent Current (µA) | Package              | Features   |
|-------------|------------|---------------------|----------------|--------------|----------------------|-----|------------------------|----------------------|--|
|             |            |                     |                |              | Min                  | Max |                        |                      |  |
| SP690A      | 1          | 4.65                | 125mV          | Low          | 1                    | 5.5 | 35                     | NSOIC-8              | <ul style="list-style-type: none"> <li>▪ Watchdog timer</li> <li>▪ Back-up battery switchover</li> <li>▪ Power fail, low battery indicator</li> </ul>  |
| SP690S      | 1          | 2.925               | 75mV           | Low          | 1                    | 5.5 | 25                     | NSOIC-8              | <ul style="list-style-type: none"> <li>▪ Watchdog timer</li> <li>▪ Back-up battery switchover</li> <li>▪ Power fail, low battery indicator</li> </ul>  |
| SP691       | 1          | 4.65                | 125mV          | Low/High     | 1                    | 5.5 | 35                     | NSOIC-16<br>WSOIC-16 | <ul style="list-style-type: none"> <li>▪ Programmable watchdog timer</li> <li>▪ Back-up battery switchover</li> <li>▪ Power fail, low battery indicator</li> <li>▪ Chip enable gating</li> </ul> |
| SP705       | 1          | 4.65                | 150mV          | Low          | 1.1                  | 5.5 | 40                     | NSOIC-8              | <ul style="list-style-type: none"> <li>▪ Watchdog timer</li> <li>▪ Power fail, low battery indicator</li> <li>▪ Manual reset</li> </ul>  |
| SP706       | 1          | 4.40                | 150mV          | Low          | 1.1                  | 5.5 | 40                     | NSOIC-8              | <ul style="list-style-type: none"> <li>▪ Watchdog timer</li> <li>▪ Power fail, low battery indicator</li> <li>▪ Manual reset</li> </ul>  |
| SP706R      | 1          | 2.63                | 80mV           | Low          | 1.1                  | 5.5 | 25                     | NSOIC-8              | <ul style="list-style-type: none"> <li>▪ Watchdog timer</li> <li>▪ Power fail, low battery indicator</li> <li>▪ Manual reset</li> </ul>  |
| SP706S      | 1          | 2.93                | 80mV           | Low          | 1.1                  | 5.5 | 25                     | NSOIC-8<br>MSOP-8    | <ul style="list-style-type: none"> <li>▪ Watchdog timer</li> <li>▪ Power fail, low battery indicator</li> <li>▪ Manual reset</li> </ul>  |
| SP706T      | 1          | 3.08                | 80mV           | Low          | 1.1                  | 5.5 | 25                     | NSOIC-8<br>MSOP-8    | <ul style="list-style-type: none"> <li>▪ Watchdog timer</li> <li>▪ Power fail, low battery indicator</li> <li>▪ Manual reset</li> </ul>  |
| SP707       | 1          | 4.65                | 150mV          | Low/High     | 1.1                  | 5.5 | 40                     | NSOIC-8              | <ul style="list-style-type: none"> <li>▪ Power fail, low battery indicator</li> <li>▪ Manual reset</li> </ul>  |
| SP708       | 1          | 4.40                | 150mV          | Low/High     | 1.1                  | 5.5 | 40                     | NSOIC-8              | <ul style="list-style-type: none"> <li>▪ Power fail, low battery indicator</li> <li>▪ Manual reset</li> </ul>  |
| SP708S      | 1          | 2.93                | 80mV           | Low/High     | 1.1                  | 5.5 | 25                     | NSOIC-8<br>MSOP-8    | <ul style="list-style-type: none"> <li>▪ Power fail, low battery indicator</li> <li>▪ Manual reset</li> </ul>  |
| SP708T      | 1          | 3.08                | 80mV           | Low/High     | 1.1                  | 5.5 | 25                     | NSOIC-8              | <ul style="list-style-type: none"> <li>▪ Power fail, low battery indicator</li> <li>▪ Manual reset</li> </ul>  |
| SP809       | 1          | 2.3, 2.6, 2.9       | 1.50%          | Low          | 0.9                  | 6   | 1                      | SOT23-3              | <ul style="list-style-type: none"> <li>▪ 140ms reset pulse width</li> <li>▪ Push-pull output</li> </ul>  |
| SP809N      | 1          | 3.1                 | 1.50%          | Low          | 0.9                  | 6   | 1                      | SOT23-3              | <ul style="list-style-type: none"> <li>▪ 140ms reset pulse width</li> <li>▪ Open drain output</li> </ul>   |
| SP813       | 1          | 4.65                | 150mV          | High         | 1.1                  | 5.5 | 40                     | NSOIC-8              | <ul style="list-style-type: none"> <li>▪ Watchdog timer</li> <li>▪ Manual reset</li> </ul>   |

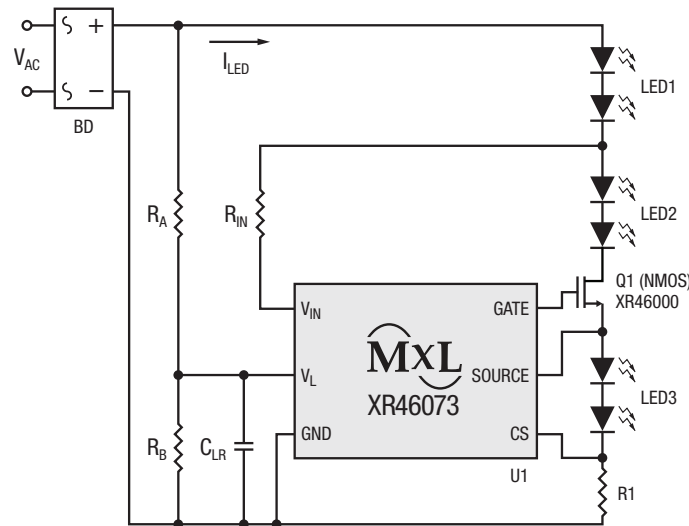
## AC Step Drivers

Exar is the world leader in AC step driver solutions for LED bulbs, tubes, troffers, downlights and decorative LED applications. Our patented distributed architecture eliminates the need for magnetics, MOVs and electrolytic capacitors providing robust, cost effective and extremely small solutions with low flicker, high power factor and low THD.

### Applications

- Downlight
- High bay
- Specialty
- Architectural

| Part Number | Steps | Max Voltage (V) | I <sub>OUT</sub> MAX (mA) | Power Line Regulation | Dimming           | Package          | Features  |
|-------------|-------|-----------------|---------------------------|-----------------------|-------------------|------------------|---|
| XR46203     | 2     | 78              | 180                       | Y                     | Y; Triac          | TDFN-8           | <ul style="list-style-type: none"> <li>▪ 2-step integrated driver</li> <li>▪ Better thermal performance</li> <li>▪ Built in thermal foldback and VIN pin clamp</li> </ul>           |
| XR46110     | 1     | 78              | 180                       | Y                     | Y; Triac          | TDFN-6           | <ul style="list-style-type: none"> <li>▪ 1-step driver</li> <li>▪ Improved line regulation</li> <li>▪ Built in thermal foldback and VIN pin clamp</li> </ul>                        |
| XR46073     | 2     | 78              | 180                       | Y                     | Y; Triac          | TDFN-6           | <ul style="list-style-type: none"> <li>▪ 2-step integrated driver</li> <li>▪ Improved line regulation</li> <li>▪ Built in thermal foldback and VIN pin clamp</li> </ul>             |
| XR46050     | 2     | 78              | 180                       | N                     | Y; Triac          | TDFN-6           | <ul style="list-style-type: none"> <li>▪ 2-step integrated driver</li> <li>▪ Smallest footprint solution</li> <li>▪ Built in thermal foldback and VIN pin clamp</li> </ul>          |
| XR46084     | 1     | 80              | 130                       | N                     | Y; Triac          | TDFN-6, SOT-89-5 | <ul style="list-style-type: none"> <li>▪ 1-step driver</li> <li>▪ For use in non-dimmable applications</li> </ul>   |
| XR46083     | 1     | 80              | 130                       | N                     | N                 | TDFN-6, SOT-89-5 | <ul style="list-style-type: none"> <li>▪ 1-step driver</li> <li>▪ For use in non-dimmable applications</li> </ul>   |
| XR46010     | 1     | 80              | 60                        | -                     | Y; Improved Triac | SOT23-3          | <ul style="list-style-type: none"> <li>▪ Improves TRIAC dimmable performance when used with other AC step drivers</li> </ul>  |
| XR46014     | 1     | 80              | 250                       | N                     | Y; Triac          | SOT223-3         | <ul style="list-style-type: none"> <li>▪ 1-step driver</li> <li>▪ For use in dimmable applications and full balance systems</li> </ul>  |
| XR46000     | -     | 600             | -                         | -                     | -                 | SOT223-3         | <ul style="list-style-type: none"> <li>▪ N-Channel Power MOSFET</li> <li>▪ Use with all Exar step driver solutions</li> <li>▪ Provides &gt; 750V native surge capability</li> </ul> |
| XR46701     | 1     | 40              | -                         | Y                     | Y; Analog/PWM     | TDFN-8, MSOP-8   | <ul style="list-style-type: none"> <li>▪ Supports dual voltage range lighting engines and low power smart lighting</li> </ul>   |
| XR46004-Q   | 1     | 75              | 600                       | N                     | PWM               | TO-252-5         | <ul style="list-style-type: none"> <li>▪ Internal pass device</li> </ul>  |



Two-Step LED Current Controller

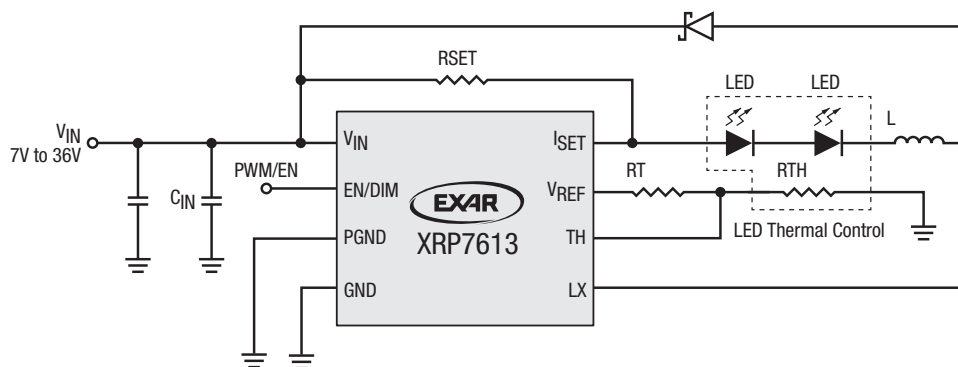
Switching Regulators

Efficiency, performance, size and reliability are rapidly imposing LEDs as the lighting solution of choice in space-constrained portable electronic equipment as well as in architectural and accent lighting fixtures. Exar's LED lighting products offer compact and efficient solutions for line and battery-operated devices and are capable of driving multiple LEDs in various series or parallel topologies.

Applications

- General lighting and display
- Medical and industrial instrumentation
- Keypad and signage backlighting

| Part Number | Ch. | Max Current/ Ch. | LEDs/ Ch. | Operating Voltage (V) |     | Ref. Voltage (mV) | Freq. (MHz) | Max Output Voltage (V) | Quiescent Current ( $\mu$ A) | Efficiency (%) | Package | Application      | Features  |
|-------------|-----|------------------|-----------|-----------------------|-----|-------------------|-------------|------------------------|------------------------------|----------------|---------|------------------|---|
|             |     |                  |           | Min                   | Max |                   |             |                        |                              |                |         |                  |   |
| XRP7613     | 1   | 1.2A             | 8         | 7                     | 36  | 100               | <1          | 36                     | 35                           | 95             | SOIC-8  | High-powered LED | <ul style="list-style-type: none"> <li>▪ Hysteretic PFM control</li> <li>▪ Enable and soft-start functions</li> <li>▪ Analog and PWM dimming</li> <li>▪ Dynamic LED current thermal control</li> </ul>  |
| SP7685      | 1   | 1.2A             | 1         | 2.7                   | 5.5 | 50                | 2.4         | 5.5                    | 500                          | 94             | DFN-10  | Flash            | <ul style="list-style-type: none"> <li>▪ Charge pump topology</li> <li>▪ Enable pin, flash/torch mode</li> <li>▪ Adjustable flash current, soft-start</li> <li>▪ Flash timeout protection</li> <li>▪ Overvoltage, overcurrent and temperature protection</li> </ul> |
| SP6686      | 1   | 400mA            | 1         | 2.7                   | 5.5 | 50                | 2.4         | 5.5                    | 500                          | 94             | DFN-10  | Flash            | <ul style="list-style-type: none"> <li>▪ Charge pump topology</li> <li>▪ Enable pin, flash/torch mode</li> <li>▪ Adjustable flash current, soft-start</li> <li>▪ Overvoltage, overcurrent and temperature protection</li> </ul>                                     |
| SP6699      | 1   | 20mA             | 6         | 2.5                   | 16  | 200               | 1.2         | 27                     | 3.2                          | 84             | SOT23-6 | Backlight        | <ul style="list-style-type: none"> <li>▪ Integrated Schottky diode</li> <li>▪ Enable pin, PWM dimming</li> <li>▪ Soft-start</li> </ul>  |



1.2A 36V Step-Down LED Driver

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